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| 10/581,525 | 06/02/2006 | Satoshi Ebata | 292116US0PCT | 6247 |

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| EXAMINER | |
|---|---|
| HUHN, RICHARD A | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1796 | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/581,525 | EBATA ET AL. | |
| | Examiner | Art Unit | |
| | RICHARD A. HUHN | 1796 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *23 March 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

1. Any rejections and/or objections made in the previous Office Action and not repeated below, are hereby withdrawn.

2. The amendment of claim 1 (to include an amount of ethylene as recited in originally presented claim 5) has changed the scope of claims 1-4 and 6. The amended claims were not present at the time of the preceding action, and therefore the new grounds of rejection set forth below for claims 1-4 and 6 are necessitated by applicant's amendment filed on 23 March 2009. Newly presented claims 7-15 were not present at the time of the previous office action. Therefore, the grounds of rejection set forth below for claims 7-15 are necessitated by applicant's amendment filed on 23 March 2009.

3. For these reasons, the present action is properly made final.

### *Claim Rejections - 35 USC § 103*

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 1-4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent Application Publication No. 2003/0119961 A1 (herein "Oshima") in view of *Macromolecules* **2002**, *35*, 8969-8977 (herein "Rhodes"). These documents were cited in the previous Office Action.

8. As to claim 1: Oshima discloses a method of preparing cycloolefin addition polymers by polymerizing norbornene-type monomers (see abstract) in the presence of a multicomponent catalyst (page 10, paragraph 197) that comprises:

a. a palladium compound, for example palladium acetate (page 10, paragraph 199, 3rd line);

b. a Lewis acidic boron compound, for example boron trifluoride (page 10, paragraph 206, 2nd line); and

c. a phosphine compound (page 10, paragraph 211, 4th line).

9. Oshima further discloses that a molecular weight modifier may be used in the amount of 1.2 mol % (page 16, example 1, paragraph 335) (15 mmol styrene / 1250 mmol monomers = 1.2 %). Oshima fails to specifically name the process in which the phosphine compound has a cone angle between 170-200° as presently recited, or in which ethylene is used as the molecular weight modifier in an amount of 0.1 to 5% by weight, as presently recited.

10. Rhodes discloses a method of preparing cycloolefin addition polymers by polymerizing norbornene-type monomers (abstract) in the presence of a multicomponent catalyst (page 8973, col 1, paragraph beginning with "Polymerization Using Multicomponent Catalyst Systems") that comprises:

d. a palladium compound (page 8975, col 1, paragraph beginning with "To test this hypothesis", 4th line)

e. an ionic boron compound, for example, $Li[B(C_6H_5)_4]\cdot 2.5Et_2O$ (ibid., 5th line)

11. Rhodes teaches that the multicomponent catalyst for this method of polymerization may contain a phosphine compound with a cone angle of about 194° (tri(*o*-tolylphosphine) (ibid., 4th line), and further teaches that ethylene may be used as a molecular weight modifier (page 8974, col 2, paragraph beginning with "Effect of α-Olefin Chain Transfer Agents", 5th line).

12. It is within the ordinary level of skill in the art to identify and use alternative and well-known ligands and molecular weight modifiers for palladium-catalyzed polymerizations. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the present invention to have used the phosphine compound and chain transfer agent taught by Rhodes for the method of Oshima, thereby arriving at the presently claimed invention, because Rhodes teaches that a phosphine compound with a cone angle between 170-200°, and ethylene in the presently claimed amount, may be used for the palladium-catalyzed polymerization of cycloolefin compounds.

13. As to claim 2: Oshima further discloses that the multicomponent catalyst can contain organoaluminum compounds (page 5, paragraph 59, 2nd line). Examples are given on page 10, paragraph 204.

14. As to claim 3: Oshima further discloses that the cycloolefin monomers may include compounds of instant formula (1) in the amount of 60-99.5% (see page 9, paragraph 179, labeled therein "repeating unit (b)"), and compounds of instant formula (2) with a silyl group in the amount of 0.5-30% (see page 8, paragraph 127, labeled therein "repeating unit (a)"). See formulas (5) and (6) and subsequent examples of these repeating units (a) and (b), respectively, which conform to instant formulas (2) and (1), respectively. Paragraph 90 discloses 5-[1'-methyl-2'5'-dioxa-1'-silacyclopentyl]-bicyclo[2.2.1]hept-2-ene,  , which corresponds to instant formula (2)-2. Paragraph 132 discloses 5-ethyl-bicyclo[2.2.1]hept-2-ene,  , which corresponds to instant formula (1).

15. As to claim 4: Oshima further discloses palladium acetate (page 10, paragraph 199, 3rd line), which is a palladium salt of the organic carboxylic acid acetic acid.

16. As to claim 6: Oshima further discloses that the monomer bicyclo[2.2.1]hept-2-ene may be present in the amount of 95% of all the monomers (page 16, example 1, paragraph 335) (1187.5 mmol / 1250 mmol = 95%). Oshima further discloses that the

polymerization solvent may be the alicyclic hydrocarbon solvent cyclohexane (see page 11, paragraph 238, 7th line).

17. As to claim 7: Oshima further discloses that the catalyst may include an ionic boron compound (see paragraph 59).

18. As to claim 8: Oshima further discloses that the catalyst may include an ionic aluminum compound, such as methylalumoxane (see paragraph 204).

19. As to claim 9: Oshima discloses that the catalyst may include Lewis acidic organoaluminum compounds as presently recited, such as triethylaluminum (see paragraph 204).

20. As to claim 10: As applied to claim 1 above in paragraph 8, Oshima disclose that the catalyst may include a Lewis acidic boron compound such as boron trifluoride.

21. As to claims 11 and 12: Oshima fails to disclose a palladium catalyst with phosphine ligands having alkyl or cycloalkyl substituents, as presently recited. However, as set forth above in paragraph 12, it is within the ordinary level of skill in the art to identify and use alternative and well-known ligands for palladium-catalyzed polymerizations.

22. Rhodes teaches that the multicomponent catalyst for this method of polymerization may contain a phosphine compound having alkyl or cycloalkyl groups, such as tri(*t*-butyl)phosphine or tri(cyclohexyl)phosphine (see page 8974, table 5). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the present invention to have used the phosphine ligands taught by Rhodes for the method of Oshima, thereby arriving at the presently claimed invention, because Rhodes

teaches that a such phosphine compounds may be used for the palladium-catalyzed polymerization of cycloolefin compounds.

23. As to claim 13: As applied to claim 1 above in paragraph 11, Rhodes discloses the phosphine ligands having an aryl group, such as tri(*o*-tolylphosphine).

24. As to claim 14: As applied to claim 1 above in paragraph 8, Oshima discloses the palladium compound palladium acetate.

25. As to claim 15: As applied to claim 1 above in paragraphs 9-12, Oshima discloses that the molecular weight modifier may be used in the amount of 1.2%, and Rhodes teaches that ethylene may be used as a molecular weight modifier.

***Response to Amendment***

26. The amendment of claim 1 to include the limitation of claim 5 is acknowledged. The corresponding cancellation of claim 5 is acknowledged. The amendment of claims 4 and 6 to correct the dependency is acknowledged. The presentation of new claims 7-15 is acknowledged, and support for these new claims in the previously presented claims is acknowledged.

***Response to Arguments***

27. Applicant's arguments filed 23 March 2009 have been fully considered but they are not persuasive. Applicant argues (pages 9-10 in the Remarks section) that the

substitution of the ligands and molecular weight modifier of Rhodes into the method of Oshima gives the unexpected result that the monomer conversion is lower than that of the presently disclosed examples. However, the instant claims do not recite any limitation regarding the monomer conversion. Applicant's argument that the combination of Rhodes and Oshima fails to suggest the presently claimed process because the specific combination of Rhodes and Oshima cited in the previous Office Action does not give a desired monomer conversion, is therefore found unpersuasive.

***Conclusion***

28. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

29. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

30. This action is a final rejection and is intended to close the prosecution of this application. Applicant's reply under 37 CFR 1.113 to this action is limited either to an appeal to the Board of Patent Appeals and Interferences or to an amendment complying with the requirements set forth below.

31. If applicant should desire to appeal any rejection made by the examiner, a Notice of Appeal must be filed within the period for reply identifying the rejected claim or claims appealed. The Notice of Appeal must be accompanied by the required appeal fee.

32. If applicant should desire to file an amendment, entry of a proposed amendment after final rejection cannot be made as a matter of right unless it merely cancels claims or complies with a formal requirement made earlier. Amendments touching the merits of the application which otherwise might not be proper may be admitted upon a showing a good and sufficient reasons why they are necessary and why they were not presented earlier.

33. A reply under 37 CFR 1.113 to a final rejection must include the appeal from, or cancellation of, each rejected claim. The filing of an amendment after final rejection, whether or not it is entered, does not stop the running of the statutory period for reply to the final rejection unless the examiner holds the claims to be in condition for allowance. Accordingly, if a Notice of Appeal has not been filed properly within the period for reply, or any extension of this period obtained under either 37 CFR 1.136(a) or (b), the application will become abandoned.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RICHARD A. HUHN whose telephone number is (571) 270-7345. The examiner can normally be reached on Monday to Friday, 7:30 AM to 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on (571) 272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/R. A. H./
Examiner, Art Unit 1796

/Vasu Jagannathan/
Supervisory Patent Examiner, Art Unit 1796